

U.S. Patent Application Serial No. 10/668,964
Amendment filed April 13, 2005
Reply to OA dated December 15, 2004

REMARKS

Claims 1-4 are pending in this application. Claims 1-3 are amended herein. No new matter has been added.

Support for the amendments to the claims is discussed below in regard to the claim rejections.

Claims 1-4 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. (Office action paragraph no. 1)

The rejection is overcome by the amendments to the claims, and reconsideration of the rejection is respectfully requested.

The phrase "morpholine ether-based" has been deleted in claims 1 and 3. Claim 1 now specifically recites formula (X) for crosslinking catalyst (B). This amendment is supported by the specification on page 12, fifth paragraph.

The phrase "as essential components" has been deleted in claim 1.

The phrase "at a molecular end" has been clarified to –at a molecular end of the urethane prepolymer–.

The error in spelling "diphenylmethane" has been corrected.

U.S. Patent Application Serial No. 10/668,964
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Claims 1-4 are rejected under 35 U.S.C. §103(a) as being unpatentable over Hung et al. ('191 or '625), each in view of Lee et al. ('793) or Oertel. (Office action paragraphs no. 3-4)

The rejection is overcome by the amendments to the claims. In particular, claim 1 has been amended to recite that the hot melt urethane prepolymer (A) is "prepared by reacting a polyisocyanate with a polyester polyol which comprises a condensate of a polyhydric alcohol and a polybasic acid, wherein the polybasic acid is selected from the group consisting of a phthalic acid, an isophthalic acid, a terephthalic acid, and a mixture thereof". Support for this amendment may be found in the specification on pages 9 and 10. In particular, the recited polybasic acids are supported by the list on page 10, lines 2-6.

As amended, the claim requires that a urethane prepolymer having an aromatic ring originating from a phthalic acid, isophthalic acid or terephthalic acid be used, in combination with the morpholine ether crosslinking catalyst (B), and sulfur atom-containing organic acid (C).

Lee et al. '793 discloses a polyurethane prepolymer system using a urethane prepolymer, bis(2,6-dimethylmorpholino)diethylether, and methanesulfonic acid, as shown in Claim 1 of the reference. However, the polyol mixture of diols and triols used for preparing the urethane prepolymer disclosed in Lee et al. '793 is a **polyether** polyol which is **not** made from phthalic acid, isophthalic acid or terephthalic acid (see column 6, line 49, to column 7, line 5, in Lee et al. '793). Lee's polyether polyol therefore does not meet the limitations of claim 1, as amended.

In addition, Applicant notes that the polyurethane prepolymer system prepared by using the polyether polyol in Lee et al. has a low softening point and is liquid at normal temperature. In

U.S. Patent Application Serial No. 10/668,964
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Reply to OA dated December 15, 2004

contrast, the hot melt urethane resin composition of the present invention is a solid at normal temperature and has a softening point within 40 to 120°C (see page 8, lines 1 to 2). Therefore, the polyurethane prepolymer system of Lee et al. '793 is different in physical properties from the hot melt urethane resin composition of the present invention. Applicant submits that the polyether polyols of Lee et al. do not suggest the limitations of claim 1.

Hung et al. '625 and Hung et al. '191 disclose a polyurethane reactive hot melt adhesive comprising a reactive urethane prepolymer and 2,2-dimorpholinodiethyl ether or di(2,6-dimethylmorpholinodiethyl)ether (see Claim 1 in either reference). Hung et al. '625 or Hung et al. '191 disclose polyhydroxy ethers and polyhydroxy polyesters as polyols for the reactive urethane prepolymer. However, Hung et al. '625 and Hung et al. '191 do not disclose a polyester polyol made from phthalic acid, isophthalic acid or terephthalic acid, and therefore do not disclose the compositional limitations of claim 1.

Applicant notes that the Hung et al. references do not suggest the phthalic acid, isophthalic acid or terephthalic acid limitation on prepolymer (A) of claim 1. In fact, the Hung et al. references do not suggest having an aromatic ring in the prepolymer, as Applicant submits that there is no suggestion in these references for this limitation of claim 1.

Oertel discloses p-toluene sulfonic acid as an inhibitor of the isocyanate reaction. However, Oertel does not disclose use of a hot melt urethane resin composition.

Applicant therefore submits that no combination of Lee et al. '793, Hung et al. '625, Hung et al. '191 and Oertel provides the compositional limitation on the hot melt urethane prepolymer (A)

U.S. Patent Application Serial No. 10/668,964
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of claim 1. Applicant also submits that there is no suggestion in the references for this limitation. Therefore, no *prima facie* case of obviousness can be made for claim 1, as amended, using these references.

In addition to arguing that no *prima facie* case of obviousness can be made for claim 1, as amended, Applicant also notes that the present invention clearly has properties that are unexpected over the cited references or any combination of the references. In particular, the unexpected effects arise from the use of phthalic acid, isophthalic acid or terephthalic acid in the polyester polyol.

In this regard, Applicant here presents a Declaration under 37 CFR 1.132 by Yukihiro MINAMIDA. The Declaration refers to the fact that phthalic acid, isophthalic acid and terephthalic acid all have aromatic rings, and discusses the effects of the combination of claim 1. The declaration shows the test results of thermal stability and creep resistance at high temperature for the following Comparative examples and Example:

Comparative example 1, which was prepared by using ingredients of Example 1 in Hung et al. '191 or '625,

Comparative example 2, which was prepared by using sulfonic acids in addition to ingredients of Example 1 in Hung et al. '191 or '625,

Comparative example 3, which was prepared by using polyester polyol having aromatic ring in addition to ingredients of Example 1 in Hung et al. '191 or '625,

Example 1, which was prepared by using sulfonic acids and polyester polyol having aromatic ring in addition to ingredients of Example 1 in Hung et al. '191 or '625,

Comparative example 4, which was prepared by using long chain aliphatic polyester polyol without aromatic ring, and

Comparative example 5 corresponding to compounds disclosed in Lee et al. '793.

Test results of Comparative example 1 show the polyurethane reactive hot melt adhesive of Hung et al. cannot provide the effect of the present invention.

Test results of Comparative example 2 show that if the polyol disclosed in Hung et al. is only combined with a sulfonic acid, the effect of the present invention cannot be provided.

Test results of Comparative example 3 show that if the polyol disclosed in Hung et al. is only combined with a polyester polyol having an aromatic ring, the effect of the present invention cannot be provided.

Test results of Comparative example 4 show that if a polyol having a long chain is used, the effect of the present invention cannot be provided. It is proven that if a polyether polyol having high molecular weight is used for preparing the urethane prepolymer of Lee et al., the polyurethane prepolymer system cannot provide a sufficient adhesive strength.

Test results of Comparative example 5 show that the polyurethane reactive hot melt adhesive of Lee et al. cannot provide the effect of the present invention.

In contrast, the test results of Example, which accords to the present invention, show good adhesive strength and thermal stability.

As explained above, it is proven that the significant effect of the present invention can be obtained only when the polyester polyol made using phthalic acid, isophthalic acid or terephthalic acid, or a mixture thereof, is used in combination with a morpholine ether-based crosslinking catalyst

U.S. Patent Application Serial No. 10/668,964
Amendment filed April 13, 2005
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(B), sulfur atom-containing organic acid (C). This effect of the present invention is unexpected over the combination of Lee et al., Hung et al. and Oertel.

Reconsideration of the rejection is therefore respectfully requested.

In view of the aforementioned amendments and accompanying remarks, the claims, as amended, are in condition for allowance, which action, at an early date, is requested.


U.S. Patent Application Serial No. 10/668,964
Amendment filed April 13, 2005
Reply to OA dated December 15, 2004

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosure: Declaration under 37 CFR 1.132

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